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(54) **Improvements relating to the processing of tobacco leaves.**

(57) Lamina and stem components of tobacco leaf are fed simultaneously to a milling machine such that there is produced a fluent mixture of lamina and stem particles. The mixture, with little or no further particle size reduction can be fed to a cigarette making machine.

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IMPROVEMENTS RELATING TO THE PROCESSING OF TOBACCO LEAVES

This invention relates to the processing of tobacco leaf material in the manufacture of smoking articles.

Tobacco leaves of the types used in the manufacture of cigarettes and like smoking articles comprise leaf lamina, a longitudinal main stem (rib) and veins extending from the main stem. The main stem and large veins are hereinafter jointly referred to as 'stem'. The stem has substantially different physical properties from the lamina, and it is long-established practice to separate the stem from the lamina at an early stage in the processing of tobacco leaves, the stem and lamina then being processed independently and differently.

The manner in which stem material is separated from lamina material is generally by means of a complex and large threshing plant comprising a number, eight for example, of serially arranged threshing machines with classification units disposed intermediate next adjacent threshing machines.

As is well known, the separated stem material, or a proportion of it, after suitable reduction in size, is often added back to the lamina after the lamina has been subjected to further processing. Stem material is often desirable in the tobacco blend to improve fill value.

It is general practice in the reduction of stem size for the size reduction to take place when the moisture content of the stem has been raised to a high level of approximately 30-50%, whereas reduction in the size of lamina material is generally undertaken at moisture contents in the region of 18-24%, the precise value depending very much on the type of tobacco, its treatment and the precise cutting conditions.

It is an object of the invention to provide an improved method of processing tobacco leaf material to provide a product suitable for use in smoking articles, cigarettes and cigars for example.

We have looked at ways of simplifying the overall tobacco producing process from leaf to smoking article.

We have, surprisingly, found that it is possible to use a mill for the purpose of operating simultaneously on stem and lamina to produce a product useful for incorporation in smoking articles. Whilst we are aware that it has been proposed to use a disc mill to reduce the particle size of stem material on its own, we are not aware of any use of a single mill for simultaneously reducing lamina and stem to a particulate mix of lamina and stem which is capable of being used for making smoking articles without any substantial further size-reduction process.

Prior proposals for the processing of tobacco leaves to provide filler for cigarettes and like smoking articles are numerous. Examples are to be found in the following patent specifications:

Germany (federal Republic)
954 136
New Zealand
139 007
United Kingdom
1855/2134; 413 486; 2 026 298; 2 078 085; 2 118 817; 2 119 220 and 2 131 671
United States
55 173; 68 597; 207 140; 210 191; 250 731; 358 549; 360 797; 535 134; 2 184 567; 3 026 878; 3 128 775; 3 204 641; 3 690 328; 3 845 774; 4 195 646; 4 210 157; 4 248 253; 4 323 083; 4 392 501; 4 582 070; 4 696 312 and 4 706 691.

According to one aspect thereof the present invention provides a method of processing tobacco leaf material, wherein tobacco leaf lamina and tobacco leaf stem are fed together through a leaf reduction apparatus, the arrangement of said apparatus and the processing conditions being such that there exits said apparatus a product which is a mixture comprising flakes of said lamina and shreds of said stem.

According to another aspect thereof the present invention provides a smoking material comprising a mixture of lamina particles and stem particles, which material is the product of feeding tobacco leaf lamina and tobacco leaf stem together through a leaf reduction apparatus.

Lamina and stem fed to the leaf reduction apparatus are suitably comprised in whole leaf, as hereinbelow defined. However, the lamina, or a proportion thereof, fed to the apparatus can be lamina prior separated from attached stem. Similarly, the stem, or a proportion thereof, fed to the apparatus can be stem prior separated from attached lamina.

By 'whole leaf' we mean complete, or substantially complete, leaves or leaves which have been reduced in size by a reduction process, such as chopping or slicing for example, that does not involve any significant separation of lamina and stem. The leaves or leaf portions will generally have been cured and may have been subject to other more or less conventional treatments.

According to a further aspect thereof the present invention provides a method of processing tobacco

leaf material to provide smoking article filler material, wherein tobacco as whole leaf, as hereinbefore defined, passes through a passage defined by co-extensive portions of first and second, relatively moving, milling elements of a leaf reduction apparatus from an inlet of said passage to an outlet of said passage remote said inlet, so as to provide at said outlet filler material comprising a mixture of lamina particles and stem particles. Preferably, the outlet of the passage is situated at the margin of the co-extensive portions.

Advantageously, a gravity feed system is used for feeding the leaf material to the inlet of the leaf reduction apparatus.

It may, in some cases, be found to be advantageous to inject low pressure steam, at one bar for example, into the leaf reduction apparatus.

The feed of leaf material to the leaf reduction apparatus may be assisted by the maintenance at the product outlet of the apparatus of a reduced air pressure, as for example, by way of use of an air lift, or by the maintenance of an elevated air pressure at the product inlet of the apparatus.

Preferably, the feed of the leaf material to the leaf reduction apparatus should be a continuous feed. It is advantageous for the feed rate to be substantially constant.

According to a yet further aspect thereof the present invention provides a smoking article filler material, which filler material is a fluent mixture comprising lamina particles and stem particles, the shape factor of about 60 per cent or more of the dust free particles of which mixture is 0.5 or above.

The concept of 'shape factor' is defined hereinbelow.

According to a yet further aspect thereof the present invention provides a method of making cigarettes, wherein tobacco bale material is reduced to provide discrete whole leaf, as hereinbefore defined; the whole leaf is fed through a mill such that there exits said mill a product which is a mixture comprising flakes of lamina and shreds of stem; and said mixture is fed to a cigarette rod making machine.

We have found that, surprisingly, methods in accordance with the invention can be performed on whole leaf having a moisture content which is significantly less than the moisture content normally employed for the size-reduction of stem. The moisture content may, for example, be in the region of half that conventional for the size-reduction of stem.

This is, of course, unexpected because one would have thought that the power needed to fiberise/shatter/disintegrate stem when it is in a relatively dry and strong condition might have led to an unacceptably extreme reduction in size of the accompanying lamina, whereas it has been found that the shattered lamina size can be controlled within acceptable limits. It was also unexpected that at low moisture contents, moisture contents in the region of 20% for example, the stem did not break down to form an unacceptable material. That is to say, the size and size distribution of both the lamina particles and the stem particles are such that mixtures thereof in accordance with the invention are suitable for being fed to a commercial cigarette rod making machine, a Molins Mk 9 for example.

In the conventional method of processing tobacco leaf material to produce cigarette filler material, the cut lamina product of the lamina processing line is mixed with the cut rolled stem product of the stem processing line. With a view to obtaining a reasonable degree of uniformity of filler character between cigarettes, attempts are made to thoroughly mix the two products. However, the respective forms of the two products are such that the products do not readily mix. Thus the further the mixing objective is pursued, the greater is the tobacco particle degradation likely to be. It is thus a significant advantage of the invention that it is an important feature thereof that in products of the invention the lamina particles and the stem particles are in intimate admixture.

Since the moisture content (of the stem fraction) can be relatively low, there is a reduced requirement for drying of the product of the size reduction apparatus, which can lead to considerable savings in equipment and energy costs.

A smoke modifying agent, a tobacco casing for example, can be applied to the tobacco leaf material before or after the processing thereof by a method in accordance with the invention.

Products of the invention can be subjected to a tobacco expansion process. Examples of expansion processes which could be employed are disclosed in United Kingdom Patent Specifications Nos. 1 484 536 and 2 176 385.

It has been found that the moisture content of whole leaf is generally the main factor which determines whether, on the one hand, stem particles are produced, or on the other hand, substantially intact stem is produced, and that, surprisingly, a sharp transition from the one product to the other product occurs at a fairly precise moisture content.

The moisture content at which this transition occurs will hereinafter be referred to as the 'transition moisture content'.

The transition moisture content of a tobacco material to be milled is readily determined by simple experimentation prior to production operation. For a Virginia tobacco whole leaf, when milled in a Quester

SM11 mill, the transition moisture content was found to be substantially 18%. An upper limit of substantially 70% for producing a mixture of lamina flakes and stem shreds was found, above which the material homogenised and clogged together in an unworkable manner.

Suitably, the upper moisture content of whole leaf material employed in processing methods in accordance with the invention does not exceed about 35%, and more suitably does not exceed about 30%.

A moisture content of about 30% at input to the leaf reduction apparatus may be appropriate where it is intended to subject the product to an expansion process in which the mixture of lamina and stem particles will be in contact with a hot gaseous medium.

Heat may be applied to the tobacco material to be fed to the leaf reduction apparatus. If heat is applied, as for example by subjecting the material to microwave radiation, the value of the transition moisture content will tend to be depressed.

Leaf material processed by a method in accordance with the invention may be of a single tobacco grade or a blend of leaf materials of a plurality of tobacco grades. When such a single grade constitutes a small proportion only of a blend, it can be the case that even if the single grade is of a moisture content less than the transition moisture content, a product of the invention can be produced so long as the mean moisture content of the blend is above the transition moisture content.

Since a leaf reduction apparatus used in carrying out a method in accordance with the invention is substantially more compact than a conventional threshing plant, with its plurality of threshing machines and classifiers and extensive associated air trunking, there will be, in use of our invention, a capital cost saving relative to the use of a conventional threshing plant. There will also be a saving in energy consumption. Furthermore, capital and energy cost savings will accrue from simplification of the primary leaf-process section in the tobacco factory. It is thus the case that by use of the present invention significant savings can be made in the overall tobacco leaf process, i.e. that process which commences with tobacco leaf as received from the farm and which ends with the making of cigarettes or other smoking articles.

It is to be observed that not only does the invention provide methods of simultaneously size reducing lamina and stem, to provide a mixture of discrete lamina particles and discrete stem particles, without a requirement for a serially arranged plurality of leaf processing machines, but furthermore, the invention provides methods which are readily carried out without a requirement to recirculate product for further size reduction. In other words, single pass operation is readily achieved.

Leaf reduction apparatus used in carrying out methods in accordance with the invention are preferably of the kind in which a material flow path extends between and across opposed faces of first and second leaf reduction elements, such that there is provided a shearing action on tobacco material as the tobacco material traverses the material flow path. Suitably, at least one of the leaf reduction elements is discoid, in which case it is advantageous that the or each of the discoid elements comprises, at the operative face thereof, generally linear, rib-form, radially extending projections. Preferably, both of the leaf reduction elements are discoid. Mills which comprise two leaf reduction elements taking the form of discs are exemplified by the Bauer model 400 and the Quester model SM11. In operation of the Bauer model 400 mill the two discs are driven in opposite directions, whereas in the operation of the Quester model SM11 mill one disc is rotated whilst the other remains stationary. A number of discs are available for the Bauer 400 mill, each of which discs is provided with a particular pattern of projections on the operative face thereof. Bauer plates designated 325 and 326 are useful in carrying out the present invention.

In the operation of disc mills for the simultaneous milling of lamina and stem, determinants of the particle size of the product are the relative speed of rotation of the discs, the size of the gap between the discs and the configuration of the milling projections at the operative faces of the discs.

Another mill which it may be possible to use for purposes of the present invention is a so-called cross-beater mill, which mill comprises a barrel-form housing in which is rotatively mounted a rotor, the shaft of which is coaxial of the housing. The inner curved surface of the housing is provided with rib-form projections extending parallel to the axis of the housing, whilst the rotor carries three equi-angularly spaced blades which extend parallel to the rotor shaft and are disposed in close proximity to the rib-form projections of the housing.

It has been found that so-called "mills" of the kind which employ an impact action, such as hammer mills, will not generally be suitable for carrying out the desired milling action.

We have examined a mill called a Robinson pin mill (model designation - Sentry M3 Impact Disrupter). This mill comprises a rotative disc and a disc-like stator, both of which elements are provided with circular arrays of pins extending perpendicularly of the opposing faces of the elements. The pins of one element interdigitate with those of the other element. The limited experience gained with the Robinson pin mill indicated that such a mill might be useful in carrying out methods in accordance with the invention.

Any ageing step may take place in respect of whole leaf as hereinbefore defined or the size-reduced

31 - Conditioning
32 - Blending
33 - Milling
34 - Drying
35 - Blending and Adding
36 - Buffer Store
37 - Cigarette Making

Steps 26-29 take place in the tobacco growing region and steps 30-37 take place in a cigarette factory.

The conditioning steps are carried out in such manner as to avoid, or substantially avoid, the removal of water extractible components.

The input material at step 26 is whole green tobacco leaf.

As may be observed from a comparison of the conventional processing method depicted in Figure 1 and the inventive processing method depicted in Figure 2, the latter method is much simpler.

Details will now be given of experiments relating to the invention.

EXPERIMENT 1

The tobacco leaf material used in this experiment was a single grade of Canadian flue-cured whole green leaf, which was purchased in farm bales of a moisture content of about 18%. The bales were sliced using a guillotine slicer to provide large leaf portions, in accordance with the definition of 'whole leaf' hereinabove, the majority of which portions were about 10 cm to about 20 cm wide.

The whole leaf material thus obtained was conditioned to a moisture content of about 26% and was then gravity fed in continuous manner, at a rate of 150 kg/hr, to a Quester disc mill (model SM11). The rotatable disc of the mill was driven at 1,000 r.p.m. The rotatable disc and the stationary 'disc' or plate, which were the standard such items for model SM 11, comprised, at the operative, opposed faces thereof, a pattern of radially extending, linear, rib- form projections.

The mill was operated at a nominal disc gap of 0.15 mm, and then at 0.15 mm increments of disc gap up to a nominal disc gap of 0.9 mm. Steam was supplied to the interior of the mill at 1 bar pressure.

The milled product obtained at each of the disc gap settings consisted of an intimate, fluent mixture of lamina particles and stem particles. All of the products were adjudged to be suitable for the manufacture of cigarettes on a conventional cigarette making machine. As was expected, as the disc gap was increased, the mean particle size of the products increased.

EXPERIMENT 2

Experiment 1 was repeated excepting that the whole leaf material was conditioned to a 24% moisture content and the nominal disc gaps were 0.15, 0.75 and 1.05 mm. The products obtained from the three runs again consisted of an intimate, fluent mixture of lamina particles and stem particles, all three products being adjudged to be suitable for the manufacture of cigarettes on a conventional cigarette making machine.

EXPERIMENT 3

The third run of Experiment 2, i.e. that with a nominal 1.05 mm disc gap setting was repeated, but with whole leaf material conditioned to a lower value of 21%. The product thus obtained consisted of a mixture of lamina particles and intact lengths of stem. Clearly then, the whole leaf material fed to the mill was of a moisture content which was less than the transition moisture content prevailing for the conditions appertaining to the experiment.

EXPERIMENT 4

Experiment 1 was repeated with the whole leaf material conditioned to a moisture content of 20% and with a feed rate of 180 kg/hr. Runs were made at nominal disc gap settings of 0.30 mm and 1.2 mm. When the nominal gap was 0.30 mm, the product was in accordance with the invention and consisted of an intimate, fluent mixture of lamina particles and stem particles. The product obtained when the nominal disc gap was 1.2 mm was, however, not in accordance with the invention and comprised a mixture of lamina particles and intact stem lengths.

A comparison of the results of this experiment and of Experiment 3 indicates that disc gap can be a determinant of the value of the transition moisture content.

EXPERIMENT 5

The tobacco leaf materials used in this experiment were three redried Zimbabwean flue-cured grades, designated A, B and C. These grades were bale sliced with the slicer set to produce 15 cm to 20 cm wide leaf portions. The whole leaf materials thus obtained were conditioned to a target moisture content of 24% and were then milled, one grade at a time, in the Quester SM11 mill at a nominal disc gap of 0.3 mm.

The products obtained with the grades B and C were acceptable products in accordance with the invention, but the product obtained with grade A consisted of a mixture of lamina particles and intact stem lengths.

Upon examination it was observed that the stems of the leaves of the grade A material, as present in the leaves when taken from a bale, are exceptionally thick and are of a markedly woody appearance.

EXPERIMENT 6

Experiment 5 was repeated but the whole leaf materials of the grades A, B and C were mixed before being conditioned to a target mean moisture content of 24%. When the mixed material was fed through the Quester mill a product was produced which was in accordance with the invention, although the product contained a very small proportion (1.2%) of intact stem pieces. These stem pieces were easily removed from the product by elutriation.

EXPERIMENT 7

Lamina strips were mixed with stem at an 80:20 weight ratio. This mixture of materials, at a target mean moisture content of 24%, was milled in the Quester SM11 with a nominal disc gap of 0.3 mm and with steam supplied at 1 bar pressure. There was thus produced a product in accordance with the invention, being an intimate, fluent mixture of lamina particles and stem particles.

EXPERIMENT 8

Whole leaf material the product of bale slicing was mixed with lamina strips at a 10:90 ratio. This mixture of materials, at a target mean moisture content of 24%, was milled in the Quester SM11 mill with a nominal disc gap of 0.3 mm and with steam supplied at 1 bar pressure. There was thus produced a product in accordance with the invention, being an intimate, fluent mixture of lamina particles and stem particles.

EXPERIMENT 9

Whole leaf material the product of bale slicing was mixed with stem at a 60:40 ratio. This mixture of materials, at a target mean moisture content of 24%, was milled in the Quester SM11 mill with a nominal disc gap of 0.3 mm and with steam supplied at 1 bar pressure. There was thus produced a product in

accordance with the invention, being an intimate, fluent mixture of lamina particles and stem particles.

In Experiments 7, 8 and 9 each of the three materials used, i.e. strips, stem and whole leaf, was a blend of the three Zimbabwean grades mentioned in Experiment 5.

EXPERIMENT 10

Three grades of United States flue cured, redried tobacco leaf material were bale sliced, the slicer being set to produce 15 cm to 20 cm wide leaf portions. The three grades of whole leaf material thus obtained were mixed before being conditioned to a target moisture content of 28%. The mixed material was fed through a Bauer model 400 disc mill with a disc gap of 3.9 mm and with a drive speed of 700 r.p.m. for each of the two discs. The discs, being a 325 disc and a 326 disc, comprised, at the operative faces thereof, a pattern of radially extending, linear, rib-form projections. The mill comprises air jets for the purpose of assisting the feed of the tobacco material through feed holes extending through the first encountered of the two discs. The milled product thus obtained was an intimate, fluent mixture of lamina particles and stem particles. The product was adjudged suitable for the manufacture of cigarettes on a conventional cigarette making machine.

It has been found generally that higher input leaf material moisture content values are required when the Bauer 400 mill is used than is the case in respect of the Quester SM11 mill.

EXPERIMENT 11

A 100 g sample of conventional U.S. flue cured cut lamina material was sieved using a sieve test apparatus comprising a box in which are disposed, one above another, five horizontally extending mesh sieves. The nominal apertures of the mesh sieves, from the top sieve down, are 1.98, 1.40, 1.14, 0.81 and 0.53 mm. The sieve test apparatus comprises reciprocative means operative to reciprocate the box and the sieves therein. The 100 g sample was evenly distributed on the upper sieve and the reciprocative means was put into operation for 10 minutes, after which time period the material fractions on the upper four sieves were recovered. The fraction on the lowermost sieve and the fraction that had passed through the lowermost sieve were of a fine dust form and were disregarded.

0.5 g sub-samples of the four recovered fractions were distributed on respective flat surfaces such that each lamina particle was spacially separated from the other particles. Each of the sub-samples was then subjected to geometric analysis by use of a Magiscan Image Analyser model 2 supplied by Joyce - Loebl. The analyser was set to obtain data as to particle area (two dimensional), length (greatest linear dimension) and perimeter length.

From the data thus obtained there were produced a histogram relating particle shape factor to frequency of occurrence (Figure 3) and a scatter diagram relating particle length to shape factor (Figure 5).

EXPERIMENT 12

A 100 g sample of a product according to the invention, obtained by milling U.S. flue cured whole leaf material at 22% moisture content in the Quester mill at a 0.3 mm disc gap, was subjected to the sieving procedure detailed in Experiment 11. Four 0.5 g sub-samples, from the upper four sieves, i.e. dust free, were geometrically analysed as per Experiment 11.

From the data thus obtained there were produced the shape factor/frequency histogram and the length/shape factor scatter diagram which constitute Figures 4 and 6 respectively.

A comparison between the histograms of Figures 3 and 4 shows the product of the invention (Figure 4) to be of a distinctly different character from the conventional cut lamina material (Figure 3). In this regard it may be observed, for example, that for the cut lamina material about 80% of the material, on a dust free basis, had a shape factor of 0.5 or less, whereas for the product according to the invention about 75% of the material, on a dust free basis, had a shape factor of 0.5 or above.

The distinctly different character of the two materials is also readily discerned from a perusal of Figures 5 and 6.

EXPERIMENT 13

Conventional cut lamina material, of a blend of the grades A, B and C mentioned in respect of Experiment 5, at a moisture content of about 12.5% was placed in a 125 ml laboratory beaker without the application to the material in the beaker of any external compactive pressure. The beaker was then upturned on a flat, horizontal surface and the beaker was removed by lifting same vertically. The resultant body of cut lamina material is as depicted in Figure 7. As may be observed, the angle of repose of the material is about 90 degrees to the horizontal.

EXPERIMENT 14

Experiment 13 was repeated using a product of the invention, obtained from a whole leaf blend of the grades A, B and C mentioned in respect of Experiment 5, at a moisture content of about 12.5%. The resultant body of material is as depicted in Figure 8. The angle of repose is about 33 degrees to the horizontal.

A comparison of Figures 7 and 8 again strongly evidences the very different characteristics of conventional lamina material and a material a product of the invention.

EXPERIMENT 15

Virginia lamina strips, Burley lamina strips and Oriental lamina strips, all of which were pre-cased,i.e. pretreated with a smoke modifying agent, were fed to a blending bin together with stem to provide a mixture in which the respective proportions of the four materials were 44%, 23%, 16% and 17% respectively. The mixture of the four materials, at a target moisture content of 24%, was fed to the Bauer 400 mill, which was operated with a disc gap of 2.7 mm and a disc drive speed of 700 r.p.m. The product was dried to a target moisture content of 14.5% and was then fed to a Molins Mk. 9.5 cigarette making machine, thus to make cigarettes the filler of which was composed 100% of the product.

Claims

1. A method of processing tobacco leaf material, wherein tobacco leaf lamina and tobacco leaf stem are fed together through a leaf reduction apparatus, the arrangement of said apparatus and the processing conditions being such that there exits said apparatus a product which is a mixture comprising flakes of said lamina and shreds of said stem.

2. A method according to Claim 1, wherein said product requires substantially no further size reduction before being incorporated in smoking articles.

3. A method according to Claim 1 or 2, wherein lamina and stem fed to said apparatus are comprised in whole leaf, as hereinbefore defined.

4. A method according to Claim 1, 2 or 3, wherein lamina fed to said apparatus is lamina prior separated from attached stem.

5. A method according to any one of Claims 1 to 4, wherein stem fed to said apparatus is stem prior separated from attached lamina.

6. A method according to any one of the preceding claims, wherein said product is fluent.

7. A method according to any one of the preceding claims, wherein the moisture content of at least a major proportion of the tobacco leaf material fed to said apparatus is above the transition moisture content, as hereinbefore defined.

8. A method according to any one of the preceding claims, wherein the tobacco leaf material fed to said apparatus is gravity fed thereto.

9. A method according to any one of the preceding claims, wherein said apparatus comprises first and second leaf reduction elements, a material flow path between and across opposed faces of said elements, and drive means operative to cause relative transverse movement between said elements.

10. A method according to Claim 9, wherein at least one of said elements is discoid.

11. A method according to Claim 9, wherein said faces are substantially conoidal.
12. A method according to Claim 9, 10 or 11, wherein said elements, at the said opposed faces thereof, comprise projections.
13. A method according to Claim 12, wherein said projections are of generally linear configuration and said projections are disposed with the linear axes thereof extending perpendicularly of the direction of said relative movement between said elements.
14. A method according to any one of Claims 9 to 13, wherein said drive means is operative to drive one only of said elements.
15. A method according to any one of Claims 9 to 13, wherein said drive means is operative to drive both of said elements.
16. A method according to any one of Claims 9 to 15, wherein said relative movement is rotative relative movement.
17. A method according to any one of the preceding claims, wherein said lamina and said stem pass once only through said apparatus.
18. A method according to any one of the preceding claims, wherein during the passage of the leaf material through said apparatus, low pressure steam is brought into contact with said leaf material.
19. A method according to any one of the preceding claims, wherein the flow of the leaf material to and through said apparatus is assisted by the maintenance at the product outlet of said apparatus of a reduced air pressure.
20. A method according to any one of the preceding claims, wherein prior to the leaf material being fed to said apparatus, said leaf material or a part thereof is treated with a smoke modifying agent.
21. A method according to any one of the preceding claims, wherein said product is subjected to a tobacco expansion process.
22. A method according to any one of the preceding claims, wherein said product is incorporated in smoking articles.
23. A method according to Claim 22, said smoking articles being cigarettes.
24. A method according to Claim 22, said smoking articles being cigars.
25. A method according to Claim 22, 23 or 24, wherein said product is fed to a smoking article making machine.
26. A method according to Claim 25, wherein, prior to being fed to said making machine, said product is subjected to no further particle size reduction, or to a minor degree only of further particle size reduction.
27. A method according to any one of Claims 22 to 26, wherein before said product is incorporated in smoking articles, said product is blended with another smoking material.
28. A smoking article comprising a smoking material which is the product of a method of processing tobacco leaf material according to any one of Claims 1 to 21.
29. A smoking article according to Claim 28 and being a cigarette.
30. A smoking article according to Claim 28 and being a cigar.
31. A smoking material comprising a mixture of lamina particles and stem particles, which material is the product of feeding tobacco leaf lamina and tobacco leaf stem together through a leaf reduction apparatus.
32. A smoking material according to Claim 31, the angle of repose thereof being not more than about 45 degrees to the horizontal.
33. A smoking material according to Claim 32, the angle of repose thereof being not more than about 35 degrees to the horizontal.
34. A smoking material according to Claim 31, 32 or 33, the shape factor of about 60 per cent or more of the dust free particles of which is 0.5 or above.
35. A smoking material according to Claim 34, the shape factor of about 70 per cent or more of the dust free particles of which is 0.5 or above.
36. A smoking material according to any one of Claims 31 to 35, the Borgwaldt filling value of which is less than that of comparable conventional cut lamina cigarette filler material.
37. A smoking article comprising a smoking material according to any one of Claims 31 to 36.
38. A smoking article according to Claim 37 and being a cigarette.
39. A smoking article according to Claim 37 and being a cigar.
40. A method of processing tobacco leaf material to provide smoking article filler material, wherein tobacco as whole leaf, as hereinbefore defined, passes through a passage defined by co-extensive portions of first and second, relatively moving, milling elements of a leaf reduction apparatus from an inlet of said passage to an outlet of said passage remote said inlet, so as to provide at said outlet filler material comprising a mixture of lamina particles and stem particles.
41. A method according to Claim 40, wherein said outlet is situated at the margin of the co-extensive

portions.

42. Smoking article filler material the product of a method according to Claim 40 or 41.

43. A method of making smoking articles, wherein filler material the product of the method according to Claim 40 or 41 is fed to a smoking article making machine.

44. A smoking article, which smoking article is the product of the method according to Claim 43.

45. Smoking article filler material, which filler material is a fluent mixture comprising lamina particles and stem particles, the shape factor of about 60 per cent or more of the dust free particles of which mixture is 0.5 or above.

46. A method of making smoking articles, wherein filler material according to Claim 45 is fed to a smoking article making machine.

47. A smoking article, which smoking article is the product of the method according to Claim 46.

48. A method of making cigarettes, wherein tobacco bale material is reduced to provide discrete whole leaf, as hereinbefore defined; the whole leaf is fed through a mill such that there exits said mill a product which is a mixture comprising flakes of lamina and shreds of stem; and said mixture is fed to a cigarette rod making machine.

49. A method of processing tobacco leaf material substantially as described in any one of Experiments 1 and 2, and 4 to 10 detailed above, so as to obtain directly a mixture comprising flakes of lamina and shreds of stem.

Fig.1.

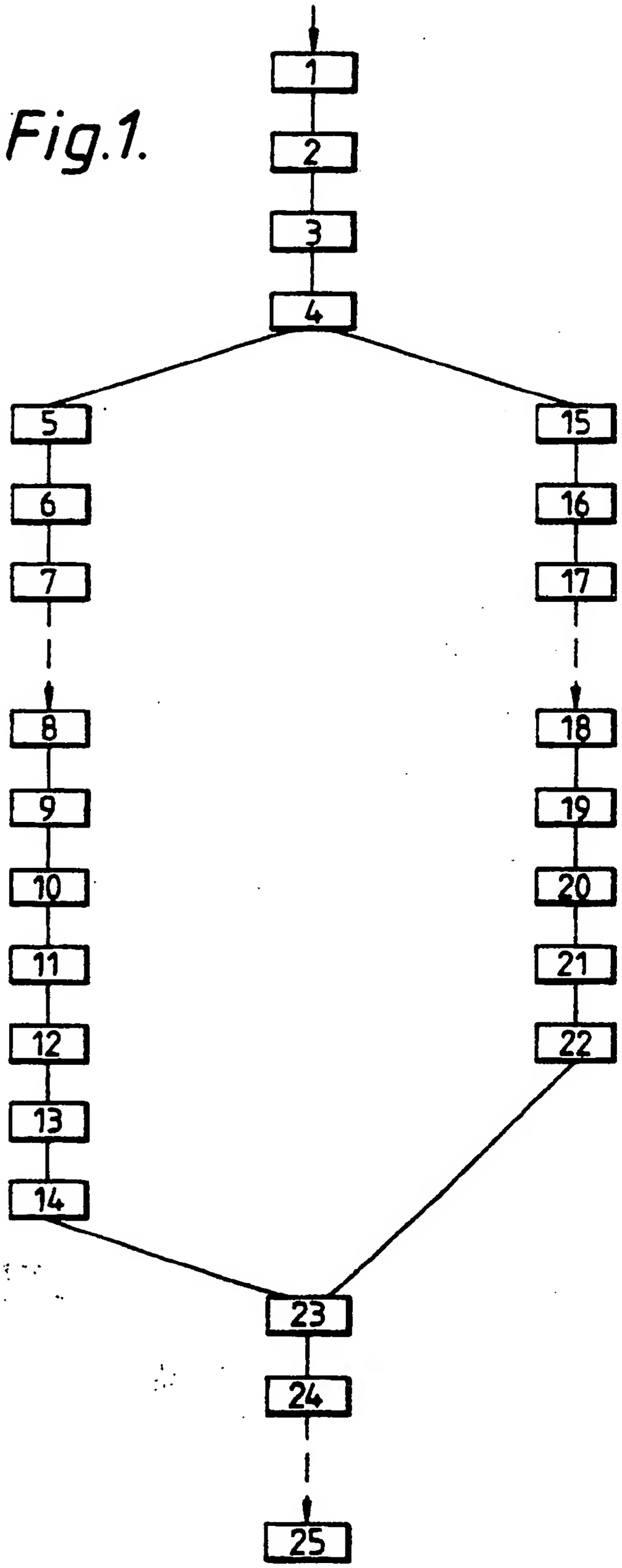


Fig.2.

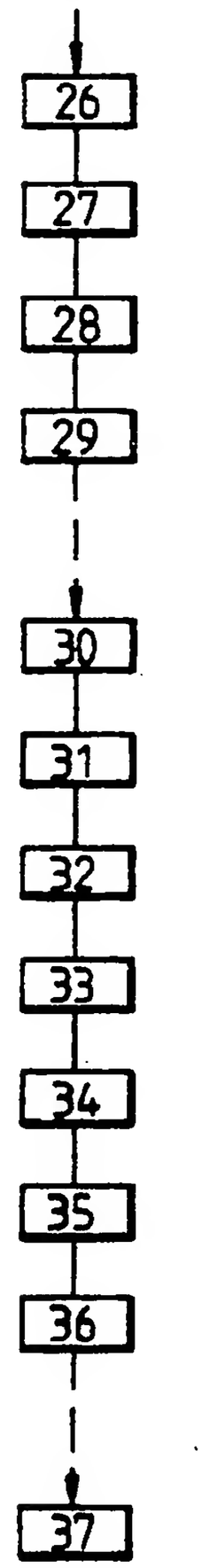
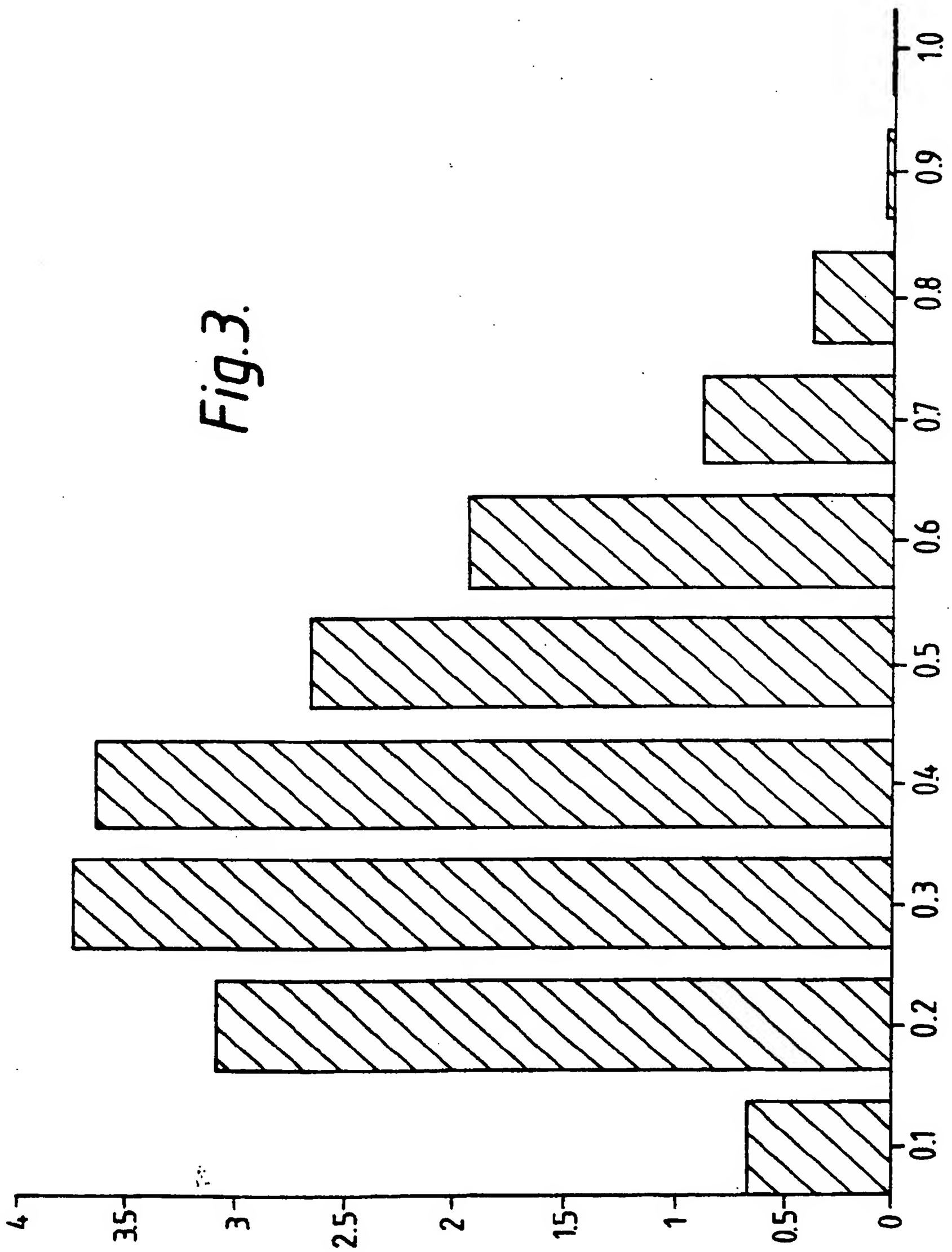


Fig.3.



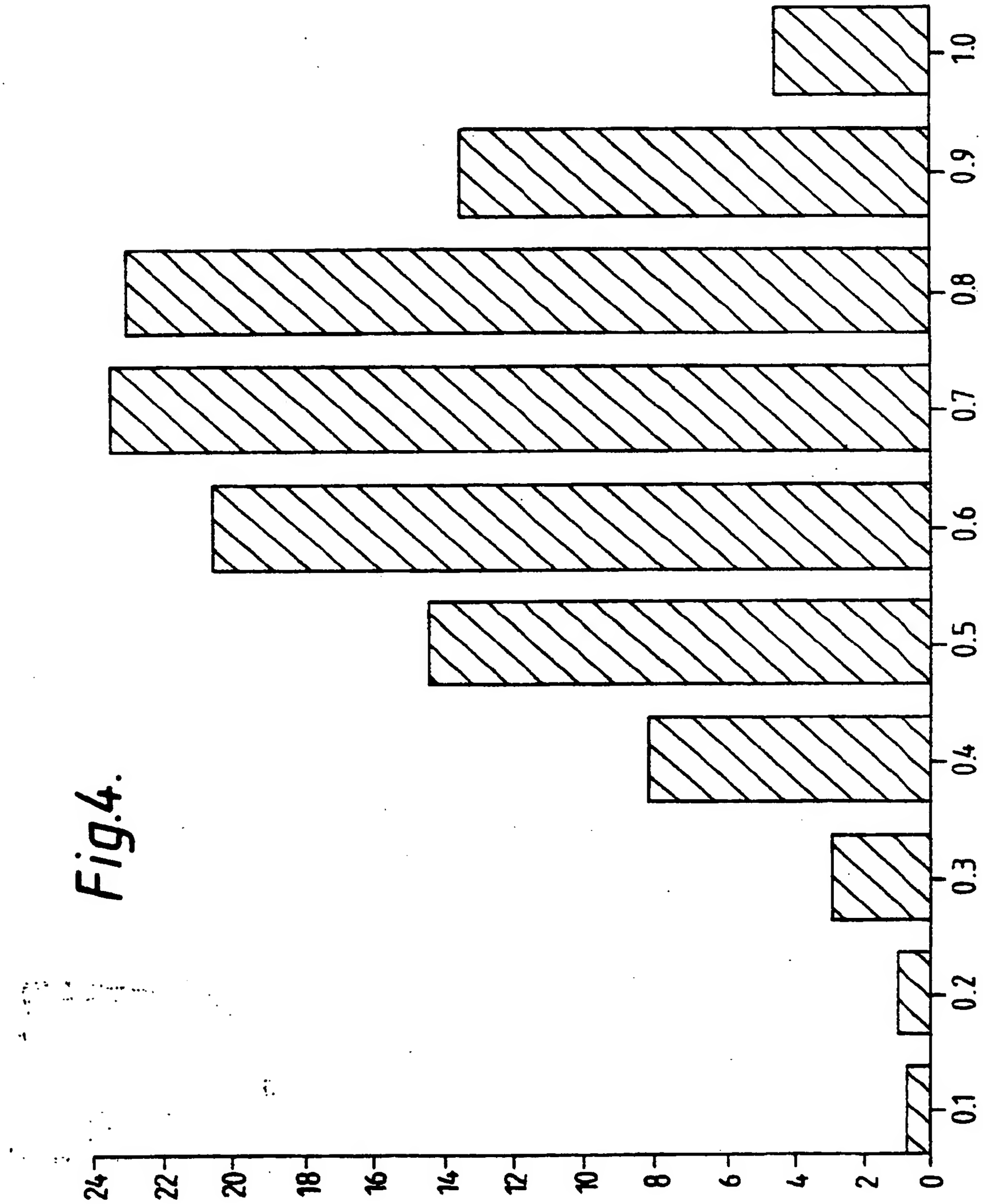
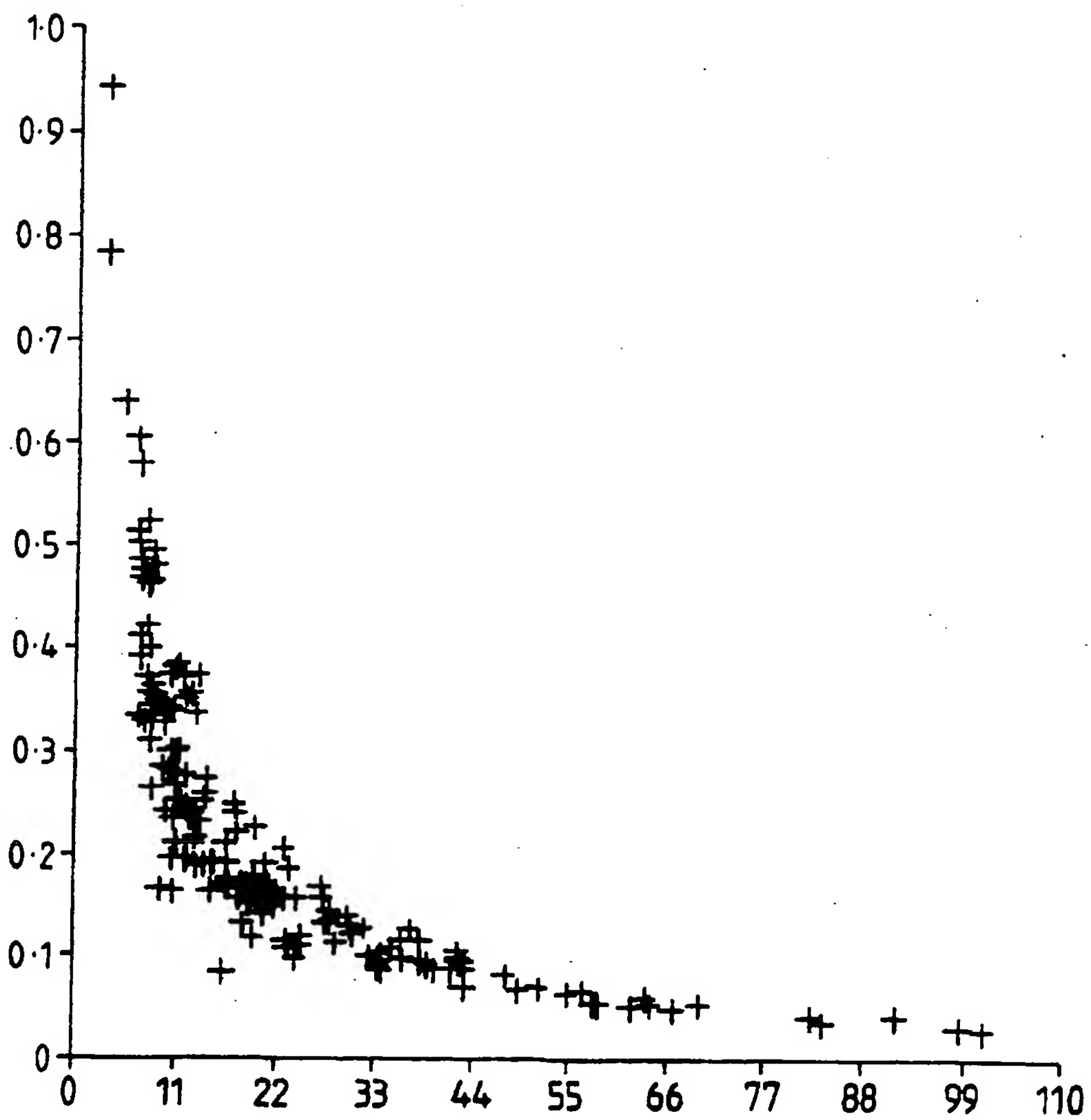


Fig.4.

Fig.5.



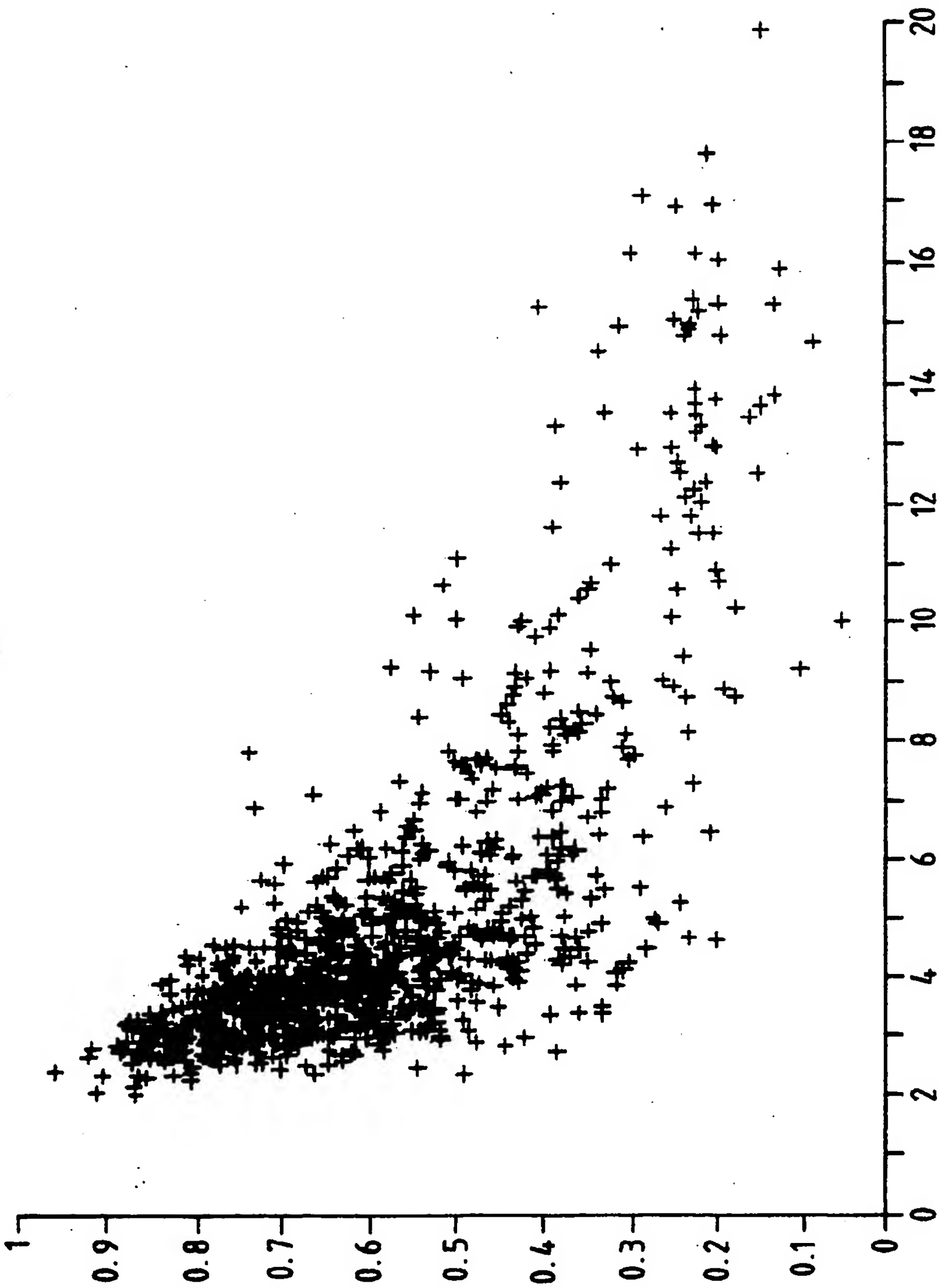


Fig.6.

Fig.7.

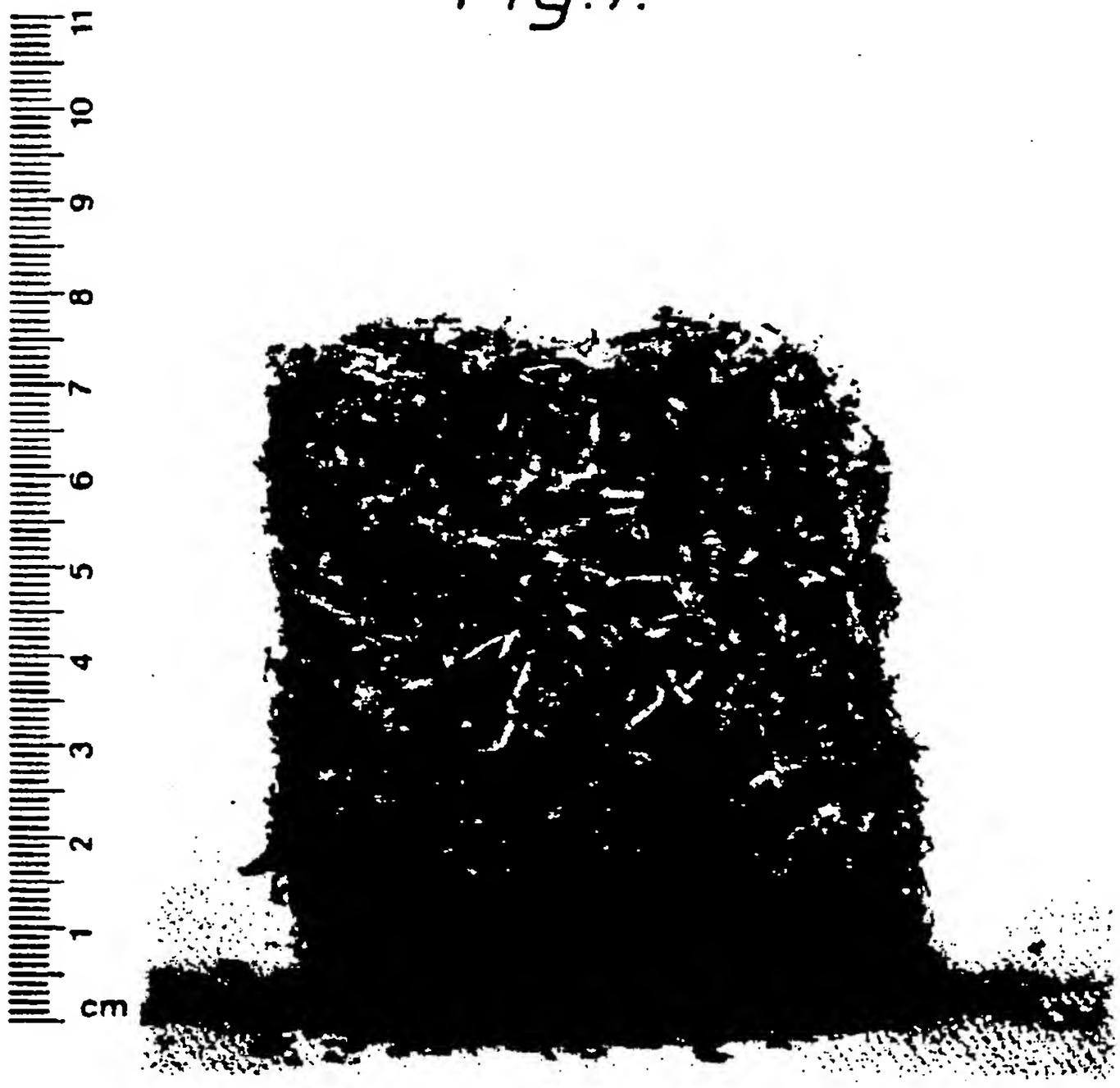


Fig.8.

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Patents Section British-American Tobacco Company Ltd. Technology Centre Regents Park Road
Southampton, S09 1PE (GB)

(54) **Improvements relating to the processing of tobacco leaves.**

(57) Lamina and stem components of tobacco leaf are fed simultaneously to a milling machine such that there is produced a fluent mixture of lamina and stem particles. The mixture, with little or no further particle size reduction can be fed to a cigarette making machine.

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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-C-141 847 (KOCH) * the whole document * ---	1-6,17, 22, 24-26, 28,30, 31,37,39	A24B3/00 A24B3/18 A24B5/00 A24B7/00
A D	FR-A-2 458 233 (BROWN & WILLIAMSON TOBACCO CORPORATION) & US-A-4 248 253 * the whole document * ---	1,8-10, 14,16, 31,40,48	
A D	FR-A-2 478 437 (ROTHMANS OF PALL MALL CANADA LIMITED) & GB-A-2 078 085 * page 9, line 1 - page 11, line 18; example 1 * ---	1,7-10, 12-16, 31,40,48	
A	DE-C-725 259 (BUSSIEN) * the whole document * ---	1,3-5, 31,40,48	TECHNICAL FIELDS SEARCHED (Int. Cl.5) A24B A24D A24C
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Place of search	Date of completion of the search	Examiner
THE HAGUE	04 JUNE 1993	RIEGEL R.E.

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EUROPEAN SEARCH REPORT

Application Number

EP 90 31 0162

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	US-A-3 204 641 (O'BRIEN JONES) ----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)

The present search report has been drawn up for all claims

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